

B1
amend

forming an opening in a first side of a semiconductor substrate, with a plurality of conductive layers overlaying each other in the opening, the conductive layers including a first conductive layer and a second conductive layer overlaying the first conductive layer such that the first and second conductive layers (i) are separated by an insulating layer in the opening, or (ii) form a P-N junction in the opening, or (iii) form a Schottky junction in the opening;

removing material from a second side of the semiconductor substrate to expose the second conductive layer in the opening on the second side of the substrate.--

Page 1, amend the paragraph beginning at line 26 to read

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--In some embodiments, the first conductive layer shields the substrate from AC signals carried by a contact pad made from the second conductive layer on a wafer backside. Contact pads on the wafer backside can facilitate vertical integration and small scale packaging. See PCT publication WO 98/19337 (TruSi Technologies, LLC, 7 May 1998) and U.S. patent application 09/456,225 filed 6 December 1999 by O. Siniaguine et al, now U.S. Patent 6,322,903. Both of these documents are incorporated herein by reference.--

Page 2, amend the paragraph beginning at line 16 to read

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--In some embodiments, a circuit manufacturing method comprises:

forming an opening in a first side of a semiconductor substrate;

forming at least three conductive layers overlaying each other in the opening, such that each two consecutive conductive layers (i) are separated by an insulating layer in the opening, or (ii) form a P-N junction in the opening, or (iii) form a Schottky junction in the opening;

removing material from a second side of the semiconductor substrate to expose at least one of the first and second conductive layers on the second side.--

Page 7, amend the paragraph beginning at line 11 to read

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--In some embodiments, the wafer thinning is a blanket etch process. When layers 210, 310 become exposed, the etch continues and etches the substrate 110 and the layers 210, 310 at the same time. In Fig. 4A, insulator 310 protrudes down after the etch from the backside surface of substrate 110. The protruding insulator helps insulate the substrate from contact pads 320C when the contact pads are bonded to a wiring substrate or another integrated circuit. Conductor 210 also protrudes down from substrate 110, but insulator 310 protrudes more to improve insulation between conductors 210, 320. This profile is achieved by choosing the materials and the etching process so that the etch rate of wafer 110 is higher than the etch rate of layer 210 and the etch rate of layer 210 is higher than the etch rate of insulator 310. The layer 320 has the lowest etch rate (zero for example). In some embodiments, the etch is performed by fluorine containing plasma at atmospheric pressure. A suitable etcher is type Tru-Etch 3000 (Trademark) available from Tru-Si Technologies, Inc., of Sunnyvale, California. Wafer 110 is made of monocrystalline silicon. Conductor 210 is made of titanium, tungsten, molybdenum, vanadium, or their silicides, or titanium nitride, or a combination of these materials. Insulator 310 is made of silicon dioxide, silicon nitride, silicon oxynitride, or a combination of these materials. Conductor 320 is formed, or includes a layer formed, of aluminum, copper, nickel, or a combination of these materials.--

Page 14, amend the paragraph beginning at line 7 to read

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--The capacitor plates can be interconnected. In Fig. 22, the layers 320, 210.1 are connected together, as shown by a line 1910, so that the capacitors 1504.1, 1504.2 are connected in parallel between contact pad 320C and conductor 210.2 which is connected to a circuit 1510. Connection 1910 can be made outside of the opening 130. Connection 1910 can be a permanent connection. Alternatively, connection 1910 can be programmable (e.g. using a fuse or an antifuse), to allow the capacitance to be adjusted during or after manufacturing. Connection 1910 can be realized by means of contact openings (not shown) etched outside of opening 130 and allowing the layers 320, 210.1 to contact each other directly or through some other layer or layers.--